have equal interest for all of its readers. It is a matter beyond the control of the management but one of which it is fully mindful and the editor very properly points out that if the magazine is to be a well-balanced one those members who are particularly interested in certain special phases of mammalian life must be largely responsible for furnishing the materials relating to their respective fields. In the opinion of the reviewer the management is to be congratulated upon the manner in which the journal has been launched. That the magazine will be indispensable to the active worker in the domain of mammalogy is a matter of course, but it seems also eminently worthy of a place in the libraries of all our schools and colleges where biological subjects are taught, for a sufficient number of articles of non-technical nature are assured to furnish highly profitable reading of a kind that can not help but be an incentive to a wider and more intelligent interest in mammalian life.

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SPECIAL ARTICLES

FLUORESCENCE, DISSOCIATION AND IONIZATION IN IODINE VAPOR

I. FLUORESCENCE AND IONIZATION

EARLY attempts to account for fluorescence as due to radiation produced by the return to the parent molecules of electrons which were photoelectrically emitted by the exciting light have been unsuccessful, since the fluorescence of gases and vapors is not generally accompanied by ionization. Consequently, the recent viewpoint is that the primary effect of the exciting light is to cause one or more electrons of a molecule to take positions or conditions of abnormally large potential energy, without being necessarily removed from the parent molecule. This additional energy is absorbed from the exciting light, and is reemitted as radiation when the electrons return to their initial stable configurations. This fluorescent radiation may be of the same, of longer, or of shorter wave-length than the exciting light according as the return is accomplished in a single step, in several steps, or in a single step following the absorption of additional radiant energy.

We have obtained experimental evidence of the correctness of this viewpoint from measurements of the minimum energy required to ionize an iodine molecule in the normal state as compared with that required to ionize a fluorescing molecule. This energy is expressed, as usual, in terms of the minimum ionizing potential, which is found to be close to 10 volts for the normal molecule and 7.5 volts for the fluorescing molecule, excited by the green mercury line (whose wave-length is the same as that of the green absorption band of iodine, and which excites strong fluorescence). The difference, 2.5 volts, corresponds to the quantum of energy of the frequency of the exciting light by the quantum relation $eV = h\nu$. This offers direct evidence, therefore, of the existence of molecules whose electrons possess abnormal potential energy as a result of the exciting light. The existence of such unstable, and therefore active, molecules has particular bearing on the explanation of photochemical reactions, and suggests the process of chemical action recently proposed by Perrin.

II. DISSOCIATION AND IONIZATION

Two types of ionization were discovered in iodine vapour, a very weak ionization at 8.5 volts, attributed to the ionization of atoms present because of the hot filament which served as the source of the bombarding electrons, and a very intense ionization at 10 volts, attributed to the ionization of the molecules. This was tested by carrying out ionization experiments in a pyrex glass tube which could be highly heated in an electric furnace so that various degrees of dissociation of the iodine vapor could be obtained. The results thus obtained were consistent with the above assumptions that the ionizing potential of the iodine atom is 8.5 volts and that of the iodine molecule is 10 volts.

The interesting feature of this result is that the difference, 1.5 volts, corresponds exactly to V in the relation $eV = W$, where W is the heat of dissociation of iodine reckoned for a single molecule. In other words, the ioniza-

tion of an iodine molecule may consist in its dissociation and the ionization of one of the parts by the same electron impact.

This kind of a process has been suggested to estimate the heat of dissociation of hydrogen from ionization data, but the present work is the first, as far as we are aware, to give direct evidence as to which ionization effect is due to the atom and which to the molecule. It is probable that this method may be of value in determining heats of dissociation which are too high to be found by ordinary methods.

K. T. Compton,
H. D. Smyth

Princeton University,
May 18, 1920

THE AMERICAN PHILOSOPHICAL SOCIETY

At the 1920 general meeting of the American Philosophical Society, held on April 22, 23 and 24, in Philadelphia, the following comprehensive program was followed.

April 22, 2 o'clock

William B. Scott, D.Sc., LL.D., president, in the chair

Beach protection works: Lewis M. Haupt, Philadelphia.

Geographic aspects of the Adriatic problem: Douglas W. Johnson, professor of physiography at Columbia University. (Introduced by Professor W. M. Davis.)

The reefs of Tutuila, Samoa, in their relation to coral reef theories: Alfred G. Mayor, director of the department of marine biology, Carnegie Institution of Washington.

A distribution of land and water on the earth: Harry Fielding Reid, C.E., Ph.D., professor of dynamic geology and geography, Johns Hopkins University. The conception of the land of the earth as being a deeply dissected and loosely joined together mass, with its center about half way between the equator and the poles, explains nearly all the characteristics of the distribution of land and water, such as: the antipodal relation, the concentration of land about the north pole and of water about the south pole, etc.

Thyroxin: E. C. Kendall, Ph.D., of the Mayo Clinic, assistant professor of chemistry of the University of Minnesota. (Introduced by Dr. Philip B. Hawk.)

The dualistic conception of the processes of life: Samuel J. Meltzer, M.D., LL.D., head of department of physiology, Rockefeller Institute for Medical Research, New York. Animal life manifests itself by an uninterrupted stream of various forms of activities. But each of the activities is discontinuous, it is interrupted by a longer or shorter resting phase. Most physiologists look at life processes from a monistic point of view. In their opinion only action needs a cause; the reduction in action or the resting phase needs no special interpretation; they are simply due to a reduction in the extent of the cause or to its entire absence. However, seventy-five years ago, it was discovered by the brothers Weber that stimulation of the peripheral end of a vagus nerve stops the beating of the heart which remains resting in an increased state of diastole. Here a special cause, a stimulation of a nerve going to a muscle, causes a resting phase in the heart muscle. This action was termed inhibition. In the three quarters of a century since this discovery was made, numerous instances of inhibition in the various processes of animal life were discovered. From all the facts as they are known now, it must be assumed that there is in the animal life probably not a single function in which the phenomenon of inhibition is not an important factor. The part played by inhibition is on one hand to remove obstacles to an efficient action, and on the other hand to permit the living tissues to perform in the resting phase anabolic processes, that is, to build up the tissues or to replenish the material expended during the action phase. The dualistic conception of the life processes may be presented as follows. Irritability is a characteristic property of all living tissues. Irritability means the property of the tissues to react with a change in each state to a proper stimulus. The change may consist in an excitation, an increase of activity, or an inhibition, a decrease in activity. Each and every state of life of the plain tissues or of the complex functions is a resultant from the combination of the two antagonistic factors, excitation and inhibition. In a state of utmost rest the factor of inhibition prevails greatly; but there is still a remnant of the factor of the excitation which permits the tissues or the functions to remain in a state of tonus, of dormant life. On the other hand, in a state of extreme excitation there is still a remnant of the factor of inhibition which prevents the excitation from completely destroying the life of the involved tissues.